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WATCH OUT FOR RUDOLPH! He may be trespassing on your airport

by Sandy Wright

While deer/car collisions are common in the United States, many people are unaware that a number of deer/plane strikes also take place. Since 1983 there have been 245 deer-related accidents reported, most of which resulted in serious damage to the aircraft. The actual number of accidents is probably much higher than this because many accidents are not reported. The data for this article was taken from two sources, the FAA Bird Strike Database and the National Transportation Safety Board (NTSB) Aviation Accident Database. The first relies on voluntary reporting of strikes by pilots and other aviation personnel; the second is information collected during investigations of accidents or incidents involving civil aircraft by the NTSB.

We know that many strikes with wildlife are not reported for various

reasons and estimate that 80% of these strikes may be unreported. Until the FAA Bird Strike Reporting Form 5200-7 was changed to include other wildlife, only bird strikes were reported, leaving us with an incomplete picture for deer strikes in the years before 1990.

Deer and other wild ungulates (hoofed mammals) inhabit all 50 states. Species include the white-tailed deer, mule deer, moose, and elk. The white-tailed deer, which is primarily an eastern species, has been the most commonly struck ungulate. An adult white-tailed deer weighs anywhere from 100 pounds to a record 511 pounds, with an average weight of around 125 pounds. Deer run at speeds up to 36 mph. Although deer prefer to crawl under fences, if disturbed, they will easily jump a seven-foot fence from a standstill or an eight-

foot fence with a running start. Deer often travel in family groups of does and fawns. Males generally stay to themselves and only associate with females during the fall breeding season, also known as the rut. In much of North America the rut peaks in November. In southern states, which have a longer growing season, deer breed over a longer period of time.

DEER ARE INCREASING

There has been a dramatic increase in the deer population in the United States in recent years. At the turn of the century, deer had almost been hunted to extinction with only about 100,000 remaining, but they now number about 24 million.

Airports often are situated in outlying areas and are frequently surrounded by good deer habitat. Land-



ing fields provide prime locations for grazing because they are planted with grasses and other plants that attract deer. Deer, in and around airports, should be a concern for pilots and airport managers because 83% of aircraft-mammal strikes are caused by deer.

FEMALES ON THEIR MIND

The worst month for deer-related incidents is November when the deer are on the move because of the rutting season. Young males are being chased off by adult bucks who are also busy courting does. These distractions are believed to be the reason that one-fourth of all deer accidents occur at this time.

WORST TIME TO FLY

Deer are most active in the twilight hours and at night when they feed. That is not to say that you won't see deer during the day, just that they are usually resting at this time. As you might guess, deer strikes with aircraft occur most often at dusk (47 strikes per hour) and at night (11 strikes per hour) when deer are most difficult to see. For example, one unfortunate pilot noticed a vague shape off the right side of the aircraft during take-off

on a dark night. He continued down the runway until his Piper PA-32R collided with an 180-pound deer.

Another pilot reported that a deer ran in front of his Cessna 172 during the flare for a night landing. The prop hit and killed the deer and the nose gear and bottom of the engine compartment were damaged. After the collision, the pilot smelled fuel fumes. When the front of the plane started sliding on the runway, a fire developed which destroyed the aircraft.

It was dusk when a Cessna 421 struck two deer. Although the pilot was not injured, the plane received substantial damage. The landing gear strut collapsed causing both props to hit the runway. The Cessna came to a stop on its main landing gear and the bottom of the fuselage just aft of the nose. The airport was closed for two and a half hours to clear the runway.

ACCIDENTS WHILE AVOIDING DEER

Some accidents were caused, not by actually hitting the deer, but by the pilot trying to avoid deer on the runway. These accidents occurred most often during the day (47%) when the pilot was able to see the deer but still resulted in 89% of the aircraft involved sustaining some degree of damage.

Extent of Damage	Damage caused by striking deer		Damage caused by avoiding deer	
	No. of incidents	% of incidents	No. of incidents	% of incidents
Destroyed	4	2	2	6
Substantial	83	40	29	81
Minor	74	35	1	3
Unknown damage	9	4	1	3
None	32	15	3	8
Unknown	7	3	0	0
TOTAL	209		36	

Table 1. Type of damage to aircraft

Year*	No. of reported strikes	% of strikes
1983	4	2
1984	3	1
1985	3	1
1986	8	4
1987	4	2
1988	2	1
1989	0	0
1990	10	5
1991	21	10
1992	30	14
1993	28	14
1994	52	25
1995	32	15
1996**	12	6
TOTAL	209	

*Deer strikes before 1990 were not reported to FAA on Form 5200-7
**1996 includes only January through August

Table 2. Number of aircraft collisions with deer per year

One such incident occurred in Georgia when a pilot reported that he was landing the airplane in a strong left crosswind. As the airplane touched down, a deer darted across the runway. The pilot swerved abruptly to avoid the deer and was unable to recover directional control. The left wing dragged the ground and the airplane nosed over when it rolled into a shallow, wide ditch. Luckily, there were no injuries, but the plane was damaged substantially.

Another pilot, in his attempt to avoid a collision, caused the airplane to veer off the right side of the runway into a stand of trees. He probably would have had a better chance with the deer—at least it might have moved!

PHASE OF FLIGHT

Most strikes happen during landing roll (57%) followed by take-off (30%). Only 9% occur on climb and approach combined. Somewhere between 53% and 79% of all deer encounters have

an effect on the flight, from aborted take-off to engines shut down to precautionary landings.

Although only 1% of strikes occur during taxiing, they can be just as serious as other strikes at higher speeds. In December 1994, the pilot of a Cessna 172 lost directional control of his aircraft while taxiing when seven deer crossed in front of the plane. He hit four deer and then hit trees on the

State	No. of reported strikes	% of total strikes
PA	26	12
WV	23	11
NY	17	8
MI	18	9
NJ	16	8
WI	9	3
VA	8	4
CT	7	3
MD	7	3
OH	6	3

Table 3. Top 10 states for deer strikes

Month	No. of reported strikes	% of strikes
JAN	9	4
FEB	6	3
MAR	14	7
APR	12	6
MAY	10	5
JUNE	13	6
JULY	17	8
AUG	11	5
SEPT	12	6
OCT	36	17
NOV	51	25
DEC	18	9
TOTAL	209	

Table 4. Number of aircraft collisions with deer per month

west side of the taxi way. The plane was totaled.

DEER TAKE THEIR TOLL

The aircraft was damaged in 81% of all reported deer strikes, and in half of those strikes the damage was substantial. Reports rarely showed the cost of deer related damage: only 12% of the reports indicating damage provided estimates of the cost of repairs and time out of service. Based on the numbers from the strike reports providing damage estimates, the average deer strike cost was \$96,800. (Note that this amount does not include accidents from avoiding deer). If we multiply this by the 170 reported damaging strikes, we can estimate that the total cost since 1983 would be \$16,456,000. Remember that only about 20% of all strikes are reported so the real total is much higher. Also, none of the strikes in the NTSB database (30% of the total), which were all substantial, had figures for damage.

The most expensive strike reported was to a Hawker-Siddeley worth \$1.4 million. The 100 mph-impact tore the engine loose.

THE INVISIBLE DEER

Sometimes pilots might not see the deer or realize one was hit. For example, an instructor pilot was demonstrating night landings to his student

Time of Day	No. of reported strikes	% of strikes
Dawn	3	1
Day	34	16
Dusk	35	17
Night	128	61
Not reported	9	4
TOTAL	209	

Table 5. Number of aircraft collisions with deer by time of day

when the aircraft veered to the right on touchdown. The instructor thought that the student was on the right rudder, but failed to override him by applying left rudder. The real story wasn't discovered until the next morning. The aircraft had collided with a deer on touchdown and had dragged the deer some distance with the right main gear. This strike, not the student pilot, was what caused the aircraft to veer to the right.

DEER CENSUS

As mentioned earlier, it is estimated that there are over 24 million white-tailed deer in the United States. Deer populations vary from state to state as do the amount of deer related incidents. It seems that eastern states have the greatest problem. The state having the most deer strikes reported is Pennsylvania (13%) followed closely by West Virginia (11%) and Michigan (9%). Thirty-nine states have reported deer strikes or deer-related accidents with aircraft.

NO FATALITIES - YET

Reported injuries from deer strikes have been few. This may be because it is not one of the items specifically asked for on the FAA forms. The only serious injury reported was in 1992 in Minnesota. The pilot of a Piper Cherokee hit a deer on rotation. When he attempted to turn back to the airport, the plane crashed into some trees 1/4 mile south of the runway. The pilot was seriously injured, and the aircraft was destroyed.

WHAT IS BEING DONE?

What can be done to prevent future deer strikes? Airport managers can request help from professional wildlife biologists who will then assess each airport's particular situation and provide recommendations to solve their problem. In many cases, habitat modification to remove nearby wooded or brushy areas is all that is necessary.

At the present time, chasing deer





Photo by Sandy Wright

off runways with a vehicle before take-offs and landings is the most widely used method. Noise makers are only effective for short periods of time, because deer grow accustomed to them. Harassment and pyrotechnics are used at some airports and have proven to be only partially successful. This is not practical 24 hours a day and not all deer respond to these deterrents.

Fencing has been an effective, but expensive, management tool for excluding deer. Fences must either be between eight and 10 feet tall or, if shorter, electrified. All fences must be maintained so that deer cannot crawl under them. Cattle guards (bars of narrowly spaced steel rod) must be in place at entrances. Smaller airports cannot afford this type of protection. FAA regulations do not require airports to have a fence but only require them to take precautions against entry of large domestic animals onto air operations areas.

Supplemental feeding away from runways or the use of scent repellents

can move deer away from the runways. Feeding only works when other food sources are low or unavailable. However, feeding the deer encourages them to stay in the vicinity.

Repellents are needed in large amounts, are expensive and time consuming to apply, and require continuous reapplication. Generally they are not practical.

Deer can be captured and relocated. However, this is labor intensive, can be dangerous, and stresses the deer causing a low survival rate. Deer are extremely territorial and don't do well when placed into new surroundings. Transporting them is just too traumatic. It is also difficult to find new locations that are not already saturated with deer. Furthermore, it is unlikely that all deer can be removed this way.

In recent years several U.S. airports have had to resort to having hunters shoot deer on airports because of the number of deer on the airport property. The number one issue is to enhance airport safety.

AVOIDING DEER STRIKES

How can you avoid a damaging wildlife strike? First of all, know which airports you use are likely to have deer. Check with the appropriate FAA *Airport/Facility Directory (A/FD)* for warnings about deer populations. The Aircraft Owners and Pilots Association's (AOPA) *Aviation USA* also has specific warnings for deer at airports. Second, try to fly during daylight hours as most strikes occur at night and at twilight, especially during autumn. Finally, remember to keep control of your aircraft at all times. Many accidents were caused by pilots being distracted or trying to avoid deer on runways.

REPORT YOUR STRIKES

If you are involved in a deer or other wildlife strike accident, be sure to fill out the FAA Form 5200-7 which can be obtained from local FAA offices, airports, and the AIM, Appendix I. With the help of people reporting all



wildlife strikes, we will eventually have a strong database which can be used to assist wildlife biologists and airport managers to prevent, or at least greatly reduce, future strikes.

Author's Note: I would like to thank the following people for their assistance in providing support for this article: Ed

Cleary, FAA Office of Airport Safety & Standards; Satish Agrawal and Tom Hupf, FAA Technical Center; Richard Dolbeer and Andy Montoney, USDA/APHIS/ADC; and Gene Wright, Ohio Department of Natural Resources.

Ms. Sandra Wright is employed by the U.S. Dept. of Agriculture, National Wildlife Research Center in Sandusky, OH. She manages the FAA's Wildlife Strike Database. The database has had over 15,000 reported wildlife strikes to aircraft since 1989 and is growing by about 2,200 strikes a year. Wildlife includes birds, mammals and reptiles—in fact, any animal involved in an aircraft strike. The tables included in this article are based on information from the FAA Wildlife Strike Database and the NTSB Aviation Accident Database for January 1983 to August 1996.



Phase of flight	No. of reported strikes	% of strikes
Takeoff	63	30
Climb	10	5
Approach	9	4
Landing roll	119	57
Taxi	3	1
Not reported	5	2
TOTAL	209	

Table 6. Number of aircraft collisions with deer by phase of flight

Effect on Flight	No. of reported strikes	% of strikes
Not reported	54	26
Other	63	30
None	44	21
Aborted takeoff	25	12
Precautionary landing	21	10
Engine shut down	2	1
TOTAL	209	

Table 7. Number of aircraft collisions with deer as they affect flight

